

Amendment to Richardson, 09/835,543

1 March 2003

**REMARKS**

The Applicant thanks the Examiner for his time and consideration in discussing this application with the Applicant's agent on 25 February, 2003.

Claims 1 to 4 and 17 to 49 are pending in this application. The Applicant has made claim amendments for clarity.

The Examiner has rejected all pending claims being either anticipated by Welch et al. or directed to obvious combinations of Welch et al. with other references. For the reasons set out in the Applicant's previous amendment and the further reasons below, the Applicant respectfully requests reconsideration and withdrawal of these rejections.

As discussed in a telephone conference with the Examiner on 25 February, 2003, Welch fails to teach or suggest focusing radiation from input radiation beams onto optical switching elements. In the Welch device it is necessary that light from incoming optical fibers be collimated. Welch describes elements 19, 21, 23 and 25 as "beam expanding, collimating and focusing optical elements" (Col. 3, ln. 5). While focusing occurs in and between elements 19 and 21 and in and between elements 23 and 25 Welch is clear that the beams incident on angled grating switches 17 from refractive elements 21 are collimated - and therefore, by the definition of "collimated" - not focused on any of angled grating switches 17 (col. 4, ln. 5-7).

The applicant submits that Welch fails to disclose or suggest, any of the following features, whether taken on its own or in combination with the other cited prior art:

- a method involving "varying a focus of said selected input light beam to focus said selected input light beam on said second selected reflective optical switching element" as claimed in claim 1;
- a switch having a plurality of selectable reflective optical elements located within a range over which an adaptive optical element is capable of focusing a selected input light beam as claimed in claim 22;
- an apparatus as claimed in claim 25 having "at least one adjustable focus optical element configured to focus the optical signal onto a currently selected one of the reflective elements and, upon a different one of the reflective elements becoming the currently selected one of the reflective elements, to vary a focus of the

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- adjustable focus optical element to focus the optical signal onto the different one of the reflective elements”;
- A switch as claimed in claim 38 having a plurality of adjustable focus optical elements wherein the switch is configured so that an optical signal may be directed from a first one of the input optical channels to a first one of the output optical channels by switching a first one of the plurality of reflective elements to its reflecting state and adjusting a focus of the at least one adjustable focus optical element corresponding to the first input optical channel to focus the optical signal onto the first reflective element and the optical signal may be directed from the first one of the input optical channels to a second one of the output optical channels by switching a second one of the plurality of reflective elements to its reflecting state and varying a focus of the at least one adjustable focus optical element corresponding to the first input optical channel to focus the optical signal onto the second reflective element”
  - A method as claimed in claim 39 which includes “varying a focus of at least one adjustable focus optical element to focus the optical signal onto the reflective element”;
  - a method as claimed in claim 46 which includes “focusing an optical signal from the selected input channel onto the actuated reflective element”; or,
  - a method as claimed in claim 49 which includes “varying a focus of the selected radiation beam to focus the selected radiation beam on the second reflective optical switching element”.

Since all pending claims depend directly or indirectly from one of the foregoing claims, the Applicant submits that all pending claims patentably distinguish the prior art of record.

It would not be obvious to modify Welch to allow the beams incident on angled grating switches 17 to be focused, and especially variably focused, because angled grating switches require expanded beams of collimated light to work properly.

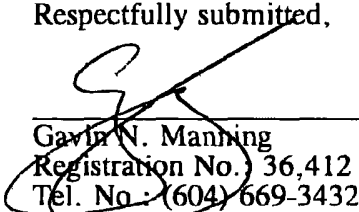
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The Applicant respectfully requests reconsideration of this application and allowance of all pending claims in light of the foregoing amendments and comments.

Respectfully submitted,

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**VERSION WITH MARKINGS TO SHOW CHANGES MADE**

In the Claims

1. (Twice Amended) A method for operating an optical crossbar switch having a plurality of selectable reflective optical switching elements, said method comprising:
  - focusing a selected input light beam on a first selected reflective optical switching element, the first selected reflective optical switching element directing the selected input light beam to a first output;
  - selecting a second reflective optical switching element; and,
  - [focusing] varying a focus of said selected input light beam to focus said selected input light beam on said second selected reflective optical switching element, the second selected reflective optical element directing the selected input light beam to a second output.
21. (Twice Amended) An optical crossbar switch for switching input light beams, the switch comprising :
  - at least one adaptive optical element having a variable focal length [variable over a range], the adaptive optical element located in a path of a selected input light beam; and,
  - a plurality of selectable reflective optical elements, [said] the selectable reflective optical elements alternately selectable and interposable in the path of the selected input light beam to direct the selected input light beam to a corresponding one of a plurality of outputs;
  - wherein [more than one] the plurality of [said] selectable reflective optical elements are located within [the] a range over which said adaptive optical element is capable of focusing [said] the selected input light beam such that the selected input light beam can be focused on any selected one of the plurality of selectable reflective optical elements by adjusting the focal length of the at least one adaptive optical element.
25. (Once Amended) An apparatus for directing an optical signal from an input channel to a selected one of a plurality of output channels, the apparatus comprising:
  - a plurality of individually switchable reflective elements located to intercept an optical signal from the input channel, the plurality of reflective elements having

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a plurality of selectable configurations, each of the configurations directing the optical signal to a corresponding one of the output channels, in each of the configurations the optical signal incident on a selected one of the reflective elements; and,

at least one adjustable focus optical element in an optical path between the input channel and the plurality of reflective elements, the at least one adjustable focus optical element configured to focus the optical signal onto a currently selected one of the reflective elements and, upon a different one of the reflective elements becoming the currently selected one of the reflective elements, to vary a focus of the adjustable focus optical element to focus the optical signal onto the different one of the reflective elements.

38. (Once Amended) A switch for switching optical signals the switch comprising:

a plurality of optical input channels and a plurality of optical output channels;

a plurality of individually switchable reflective elements, each of which is switchable between a reflecting state and a non-reflecting state; and

a plurality of adjustable focus optical elements, each of the adjustable focus optical elements in an optical path between a corresponding one of the input optical channels and the plurality of individually switchable reflective elements, each of the adjustable focus optical elements capable of selectively focusing an optical signal from the corresponding one of the input channels onto any one of a plurality of the plurality of individually switchable reflective elements;

wherein the switch is configured so that an optical signal may be directed from a [selected] first one of the input optical channels to a [selected] first one of the output optical channels by switching a [selected] first one of the plurality of reflective elements to its reflecting state and adjusting a focus of the at least one adjustable focus optical element corresponding to the [selected] first input optical channel to focus the optical signal onto the [selected] first reflective element and the optical signal may be directed from the first one of the input optical channels to a second one of the output optical channels by switching a second one of the plurality of reflective elements to its reflecting state and varying a focus of the at least one adjustable focus optical element corresponding to the first input optical channel to focus the optical signal onto the second reflective element.

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39. (Once Amended) A method for directing an optical signal from an input channel to a selected one of a plurality of output channels, the method comprising:
- actuating a reflective element to direct an optical signal from the input channel to a selected one of the output channels; and,
  - [operating an] varying a focus of at least one adjustable focus optical element to focus the optical signal [from the input channel] onto the reflective element.
49. (Once Amended) A method for redirecting a radiation beam in an optical crossbar switch comprising a plurality of individually selectable reflective optical switching elements, the method comprising:
- focusing a selected radiation beam on a first selected reflective optical switching element;
  - selecting a second reflective optical switching element; and,
  - [focusing] varying a focus of the selected radiation beam to focus the selected radiation beam on the second reflective optical switching element.